

2020

The effectiveness of response to intervention (RTI)'s model for developing basic math operations among math learning disability students

Mohammad Abualrub

Faculty of Arts and Educational Sciences, Ajloun National University, brtd_sok@yahoo.com

Follow this and additional works at: https://digitalcommons.aaru.edu.jo/anujr_b

Recommended Citation

Abualrub, Mohammad (2020) "The effectiveness of response to intervention (RTI)'s model for developing basic math operations among math learning disability students," *An-Najah University Journal for Research - B (Humanities)*: Vol. 34 : Iss. 9 , Article 8.

Available at: https://digitalcommons.aaru.edu.jo/anujr_b/vol34/iss9/8

This Article is brought to you for free and open access by Arab Journals Platform. It has been accepted for inclusion in An-Najah University Journal for Research - B (Humanities) by an authorized editor. The journal is hosted on [Digital Commons](#), an Elsevier platform. For more information, please contact rakan@aarj.edu.jo, marah@aarj.edu.jo, u.murad@aarj.edu.jo.

The effectiveness of response to intervention (RTI)'s model for developing basic math operations among math learning disability students

فاعلية نموذج الاستجابة للتدخل RTI في تنمية العمليات الحسابية الأساسية لدى الطلبة ذوي صعوبات تعلم الرياضيات

Mohammad Abualrub

محمد أبو الرب

Counseling and special education department, Faculty of Arts and Educational Sciences, Ajloun National University

E-mail: brtd_sok@yahoo.com

Received: (29/10/2018), Accepted: (16/1/2019)

Abstract

This study aimed to identify the effectiveness of response to intervention (RTI)'s model in developing basic math operations among math learning disabilities' students. The Sample of the study consisted of (30) randomly chosen students from Irbid schools. The findings revealed that the use of RTI's model has decreased the percentage of learning disability students by (63.33%). After applying RTI's model, (23) students had responded, which indicates the high forecasted value of RTI's model based on qualitative analysis. Only (19) students benefited from RTI's model where 4 students were dropped, interference methods' reliability percentage was (82.6). The researcher provided a set of recommendations in the light of these results.

Keywords: Response to Intervention (RTI), Math learning disabilities.

ملخص

هدفت الدراسة إلى معرفة فاعلية نموذج الاستجابة للتدخل RTI في تنمية العمليات الحسابية الأساسية لدى الطلبة ذوي صعوبات تعلم الرياضيات، تكونت عينة الدراسة من 30

طالباً تم اختيارهم عشوائياً من مدارس محافظة اربد، كشفت نتائج الدراسة أن نموذج الاستجابة للتدخل يقلص نسبة ذوي صعوبات التعلم بنسبة 63.33%، بعد تطبيق نموذج الاستجابة للتدخل استجاب للتدخل 23 طالباً، وهذا يدل على ارتفاع القيمة التنبؤية لنموذج الاستجابة للتدخل القائم على التحليل الكيفي. وفي مرحلة المتابعة تراجع 4 طلاب ليصبح عدد المستفيدين من النموذج 19 طالباً، وبلغت نسبة ثبات آليات التدخل 82.6. وفي ضوء نتائج الدراسة قدمت مجموعة من التوصيات.

الكلمات المفتاحية: نموذج الاستجابة للتدخل، صعوبات تعلم الرياضيات.

Introduction

Math learning disability is one of the most important problems that face student and teacher alike, and hinder the natural flow of the educational process, since there are some children who have normal intelligence level and cannot perform simple math operations, while others cannot estimate small volumes with the naked eye even it was only two, three, or more objects, they don't understand that a number could be bigger than another number, this disorder is known as (Dyscalculia), it is a specific type of learning disability which involve inborn learning disability of math calculations comprehension and understanding. It is similar to dyslexia. It contains a difficulty in understanding the numbers, learning how to multiply them, learning math theories, and other similar symptoms, despite the lack of a specified domain of learning disability (Shabier, 2011).

Dyscalculia is not known or studied as Dyslexia, some children can hide this issue by developing covering-strategies; some children do memorize the multiplication table by heart without recognizing the concept, other children find it enough to say "we don't know anything in math" without trying to understand it (Lashhab, 2015).

Shoniell found that many of learning disabilities students suffer from school absence issue, or transferring from one school to another, also, they suffer from not adapting to teaching methods (Alabsi, 2014).

According to (Shalabi, 2009), the assumptions related to the spread of Dyscalculia ranging from 3% to 6% of students. Dyscalculia does not necessarily concern higher disabilities in mathematical reasoning.

Recent studies, done under the supervision of the US National Joint Committee on Learning Disabilities (NJCLD, 2005), found that the treatment is better with the early generation, which increases the opportunities of filling the gap since first years of education are crucial to the student and has an effect on his future development. Also, early interference and treatment reduce the probability of problems escalation and accumulation of side effects.

Based on the above, the importance of Response to Intervention – RTI has been highlighted, which aims to early and quick detection of students that might be at risk with regard to acquiring basic skills in academic and other fields, it also aims to detect and determine learning disability students before transferring them to special teaching, therefore, it is considered a preventive intervention. Also, the model is considered instructional, based on early preventive plans, aims to improve students' achievement, and prevents accumulation of secondary problems. The work has to be sequenced and steady, therefore, the best venue for this work is within the classroom with the teacher (Brown-Chidsey &, Steege, 2005).

In addition to the academic skills, the intervention program focuses on (behavioral and social aspects, improving the classroom environment, developing the social skills, preserving the motivation to learn).

It is noteworthy that this model is based on three phases; intervention duration and density increase from one phase to another, the transition from one phase to another is related to students' progression, repetitive exams and transition from one phase to another is the fundamental feature of RTI.

Problem of the Study

Early attention to students with learning disabilities helps in reducing problems that might result in future education stages. The Schiffman study as reported in (Fleishner, 2004), regarding students with learning disabilities, found that early detection and identification of those students and providing effective treatment programs in the first grade led to tangible improvement with a percentage of (84%). While the improvement

was (46%) if detection and identification happened in the third grade. Also, improvement percentage doesn't exceed (18%) if detection was in the fifth grade. If diagnosis, detection, and treatment happened in the sixth grade, the improvement percentage maybe only (8%). In addition, (Gresham, 2005) highlights the importance of finding new methods to detect learning disabilities students in order to avoid problems of the discrepancy model in diagnosis where it affects the treatment method which is based on the diagnosis process. There is no good treatment without a good diagnosis.

- Prevalence of failure and school drop-out despite the country efforts to keep the children in the schools until the end of the mandatory stage.
- Failing and dropped-out students are considered as wasted capabilities in the society, even if they cannot continue studying to higher levels but they can with their basic level to occupy jobs needed by the society.
- Children with learning disabilities should enjoy their rights in learning and education like anyone else in the society, therefore, they should be taken care of at school and society by giving them the appropriate opportunities according to their capabilities.
- Learning disabilities researches indicate that the existence rate of learning disability students ranges between (7-8%) in general, it could be higher or lower from one society to another, Shalaby (2009) research indicated that students who suffer from math learning disability reached (6%) which is not few, therefore, it should be given a space with providing proper circumstances for improvement in order to enable those students to merge with their normal peers.
- Results could also contribute to providing a set of educational recommendation to authorities related to special needs, in which these recommendations can drive more support and care to learn disability students at preliminary schools in KSA, and in identifying the extent of need to specialists in learning disability domain, in addition to identifying the educational service required for this category.

Based on that, the problem of the study is highlighted in the following question:

What is the effectiveness of Response to Intervention (RTI)'s Model for Developing Basic Math Operations among Math Learning Disability Students?

Questions of the study

1. What is the effectiveness of RTI in identifying math learning disabilities compared with discrepancy criterion model?
2. What is the effectiveness of RTI in basic math operations among math learning disability students, as a qualitative analysis model compared with the discrepancy criterion quantitative model?
3. How stable are the intervention methods based on RTI's model in developing basic math operations for math learning disability students during the follow-up phase?

Objectives of the study

This study aims to identify:

- The effectiveness of RTI in identifying math learning disabilities students.
- The effectiveness of RTI in developing basic math operations among math learning disability students.
- The stability of the intervention methods in developing basic math operations for math learning disability students.

The Importance of the study

Studying the effectiveness of RTI's model in diagnosing and identifying math learning disability students represents a special importance due to:

1. This study deals with an important educational issue which were never discussed by Arabic studies and researches, which is the problem of depending on discrepancy criterion model in identifying and diagnosing math learning disability students, which identifies more

than 50% of low-achieving students as learning disability students without using RTI's model which depends on qualitative analysis in identifying and diagnosing.

2. This educational study could make an opportunity to minimize the number of math learning disability students, which will save efforts and money, by the accurate diagnosis that makes the teacher so as to provide better and more accurate services to the students.
3. This study supports early intervention for the students with learning disabilities.

Terms of the Study

Response-to-intervention: qualitative model provides direct and intensive intervention to the student prior to performing the evaluation process to identify the students who need special educational services (Sheldon, 2005, p.83).

Operational definition for RTI's model

A model based on direct and intensive teaching interventions which take place individually or among small groups in order to identify the students who suffer from math learning disabilities, therefore, providing treatment to them. The model is addressed through three phases or more, the following phase depends on the results of previous phases.

Remedial teaching: using all teaching methods, teaching media which target enhancing and developing cognitive and academic levels at all levels which are subject to treatment among learning disability students (Alzayat, 2008, p.147).

The operational definition of remedial teaching

Educational intervention based on a set of math-skills activities designed according to students' individual-diagnosis, these activities are presented to each student according to the difficulty that he showed during the diagnosis, and also, it is presented through special teaching methods; such as computers, educational toys, Vernald method ... etc.

Math learning disability: difficulty or inability of performing basic math operations, which are: addition, subtraction, multiplying, dividing and the consequent difficulties in learning algebra, geometry, and decimals (Hafeth, 2008, p.127).

Limitations of the study

Human limitations: the study has been conducted on a sample of students who suffer from learning disabilities, categorized by the discrepancy criterion as a math learning disability students, registered in the fourth grade in Irbid whom their ages ranged between 9 to 10 years old.

Special limitations: the study was applied in the public schools affiliated to Irbid Directorate of Education.

Time limitations: tools of this study were implemented during the first and the second semesters of the academic year 2017/2018. Three treatment phases, each phase duration is two weeks, 3 sessions per week, followed by the follow-up phase which was after three weeks of the intervention, total of 18 sessions.

Related studies

(Sarrell, 2014) The search for evidence-based math interventions that are easy to use and impact academic achievement are in demand, and the impact that these interventions can have on students who struggle with math achievement is of concern. In this study, the effects of Reflex math computerized intervention to improve the automaticity of basic math facts among male and female middle school students identified as at-risk for academic failure in mathematics was examined according to differences in mean scores and based on gender. A quasi-experimental pretest-posttest nonequivalent control group design was used for the purposes of the study. Convenience sampling among students receiving or qualifying for response to intervention services for math was used to determine the study participants. The Basic Math Operations Task (BMOT) served as the pretest and posttest against which differences in mean scores were determined with analysis of covariance used to examine the differences. Results, as well as assumptions, limitations, and recommendations for the future, are included.

(Sundling, 2014) This paper will explore characteristics of an effective mathematics Response to Intervention program and offer some resources for educators to use to remediate mathematics deficits. Although 80% of all learning disabilities are reading related, increasing attention is now being given to mathematics. Many effective instructional techniques and interventions have resulted from research aimed at reading needs, but schools lack sufficient recommendations for students who struggle in mathematics. Teachers can implement quality instructional strategies and solid interventions based upon reading to remediate mathematics difficulties for students in upper elementary school. Collecting data and using that data to make decisions about instruction and student support servicing can offset student mathematics deficits.

(Vaughn, S., Roberts, G. 2013). This study addressed the effects of multiyear, response-based, tiered intervention for struggling readers in grades 6–8. A sample of 768 sixth-grade students with reading difficulties was randomized to a response-based, tiered-intervention condition or “business as usual,” and initial treatment status was maintained over the three-year study. To estimate the effect of treatment and to address questions about the acceleration of learning, a multiple-indicator, multilevel growth model was fit, representing the likely trajectories of the group of students originally randomized (in the fall of sixth grade) to treatment. Three-year trajectories were fit, with the results representing likely multiyear trends for the three groups. Treatment students, on average, outperformed business-as-usual students. The effect size based on the multiple-indicator, a multilevel model was .26. Treated students also outperformed the group of typical readers when the achievement was characterized in terms of slope over time. However, a sizable gap remained between treated and typical students in the spring of eighth grade.

(Grosche & Volpe, 2013) Many students with learning and behavior problems are routinely excluded from regular education. Although calls have been made to educate students with these problems in the same settings as their typically developing peers, it remains unclear how best to support their needs for academic and behavioral support. We address this question first by describing response-to-intervention (RTI), a specific

model of prevention and early intervention for learning and behavior problems. A comprehensive summary of the RTI literature is provided. Second, we will discuss the feasibility and applicability of RTI as *one* approach to facilitate inclusion of students with learning and behavior problems. Specifically, we will demonstrate how RTI can be used to address at least four barriers to inclusion by (1) providing a clear implementation strategy for inclusion practices; (2) clearly defining the roles, responsibilities, and collaboration of general and special education teachers; (3) enabling the allocation of resources for instruction and intervention; and (4) avoiding early and unnecessary labelling of students with learning and behaviour problems. Third, limitations of RTI as a model to facilitate inclusion will be discussed.

(Maskill, 2012) The purpose of this study was to study the effectiveness of Response to Intervention strategies as they pertain to students' scores on the Northwestern Evaluation Association (NWEA) test. This study sought to answer the following questions: 1) What are the different tiers of a three-tier RTI model? 2) Is one tier more effective than the others? 3) How does participation in the RTI model affect scores on the NWEA? and 4) What is the long-term effects of participation in RTI, after services have been discontinued? This was a study conducted over four years in a select elementary school; the subjects were students identified as having reading difficulties with their previous NWEA scores. Students who participated in RTI were tracked and evaluated by their subsequent NWEA scores over the course of the study. Most students made improvements during their participation in RTI and continued to improve after services had been discontinued.

(Bryant, *et al.* 2011) The purpose of this study was to determine the effects of an early numeracy preventative Tier 2 intervention on the mathematics performance of first-grade students with mathematics difficulties. Researchers used a pretest-posttest control group design with randomized assignment of 139 students to the Tier 2 treatment condition and 65 students to the comparison condition. Systematic instruction, visual representations of mathematical concepts, purposeful and meaningful practice opportunities, and frequent progress monitoring were used to

develop an understanding of early numeracy skills and concepts. Researchers used progress-monitoring measures and a standardized assessment measure to test the effects of the intervention. Findings showed that students in the treatment group outperformed students in the comparison group on the progress-monitoring measures of mathematics performance and the measures that focused on whole-number computation. There were no differences between groups on the problem-solving measures.

(Alansari, 2009), a study aimed to identify the effectiveness of RTI model in developing word identification skill in terms of diagnosis and treatment. The sample consisted of 501 students of fourth and fifth graders in Kuwait. Results showed that the effectiveness of RTI model was obvious in the treatment for students who were identified with reading learning disability according to the discrepancy criterion model. Also, it showed that the RTI model has minimized the rate of learning disability students by 66%.

(Bryant, *et al.* 2008) Responsiveness to Intervention (RTI) is recommended both as an essential step before identifying learning disabilities (LD) and as a mechanism for preventing learning difficulties. The use of evidence-based multi-tiered interventions is of critical importance when implementing RTI. This article presents the results of a study that examined the effects of Tier 2 intervention on the performance of first-grade students who were identified as at risk for mathematics difficulties. Participants included 161 (Tier 2, N = 42) first graders. Tier 2 students received 20-minute intervention booster lessons in number and operation skills and concepts for 23 weeks. Results showed a significant intervention effect on the Texas Early Mathematics Inventories-Progress Monitoring (TEMI-PM, University of Texas System/Texas Education Agency) total standard score.

(VanDerbHeyden, Witt, & Gilbertson, 2007) aimed to identify the effectiveness of RTI model in evaluation and treatment of math and reading learning problems among learning disability students. Steep system was implemented among five preliminary schools, from first to fifth grade, starting from 2002 until 2005. Results showed a decrease in the

number of students who need special education among the five schools, and the costs were decreased by 50% after using Steep program.

Methodology of the study

The method used in this study is the experimental method with the quasi -experimental design.

Variables of the study

Independent variable: an intervention based on programs and activities prepared by the researcher according to the diagnostic models used in identifying learning disability patterns among the sample of the study.

Dependent variable: performance level of students who had been subject to the training program of math basic operations test after each phase of the previously mentioned four phases.

Population of the study

The population of the study includes all learning disability students from fourth grade in Jordan.

The Sample of the study

Before selecting the sample, the following were taken into consideration:

- The intelligence level of the sample was above moderate. Refer to student file and annual result.
- By reviewing preliminary data and school records information, students of the sample are not suffering from sensory disabilities, emotional disturbance, or bad environmental circumstances.
- Students of the sample were identified as math learning disability students by a team.

Therefore, the sample of the study consisted of (30) students from fourth grade who were identified as math learning disability students, representing a number of schools affiliated with Irbid directorate of education, schools were chosen randomly.

Tools of the study

The following tools were used to collect data and information required to answer the questions of the study:

1. **Intelligence test (non-verbal intelligence test, translated by Mursi 2008):** the modified version of the test includes concurrent validity correlations with Stanford scale, and consistency Cronbach Alpha's coefficients ranged between 0.89-0.80.
2. **Self-rating scales for math learning disabilities (Alzayyat, 2007):** the scale has validity indicators which have been verified by content validity, construct validity, factor validity, and criterion validity. The reliability indicators ranged between 0.927-0.959 by using split half and internal consistency.
3. **Treatment, diagnostic model based on multiple strategies to develop basic math operations for fourth graders, prepared by the researcher.**

The concept: the model includes intervention mechanisms that present math activities upon diagnostic models and individual activities for each student of math learning disability, according to student's need.

General objective of the treatment, diagnostic model

To develop basic math skills among learning disability students from the fourth grade by intervention methods and multi-activity methods based on diagnostic models for each case.

Preparing treatment, diagnostic model

The model activities were provided according to the needs of each student and used the teaching methods that have proved effective by previous studies, such as Keller's personalized system of instruction – advanced experience organizers – tuning method – educational toys method. Students' performance level was taken into consideration during each phase of the program, educational methods were identified or changed to meet student's needs and his favorite learning patterns, students were given enrichment homework activities and immediate enhancement for those who progressed in math basic skills.

Type of intervention

Intervention is based on preparing activities which are also based on diagnostic models that identify math basic difficulties among the sample of the study, by using the diagnostic test and the rating scale.

Time of intervention

- 30 minutes session for each student.
- Three treatment phases, each phase duration is two weeks, 3 sessions per week, followed by the follow-up phase which was after three weeks of the intervention, total of 18 sessions.

Person in charge of the intervention

Subject teacher: upon diagnosis, he applies the specified methods and activates for each student according to his results in the diagnostic tests.

The researcher: he guides the teacher and will perform –if needed– direct intervention into the educational process by teaching the student, especially in providing enhancement or in intensifying the educational activities.

Parents: supervision, follow-up at home, to ensure the benefit from enhancement activities, supervision and follow up through providing home activities to the student then he returns to the teacher for correction and rewarding, material or moral.

Methods of intervention

Pre-test

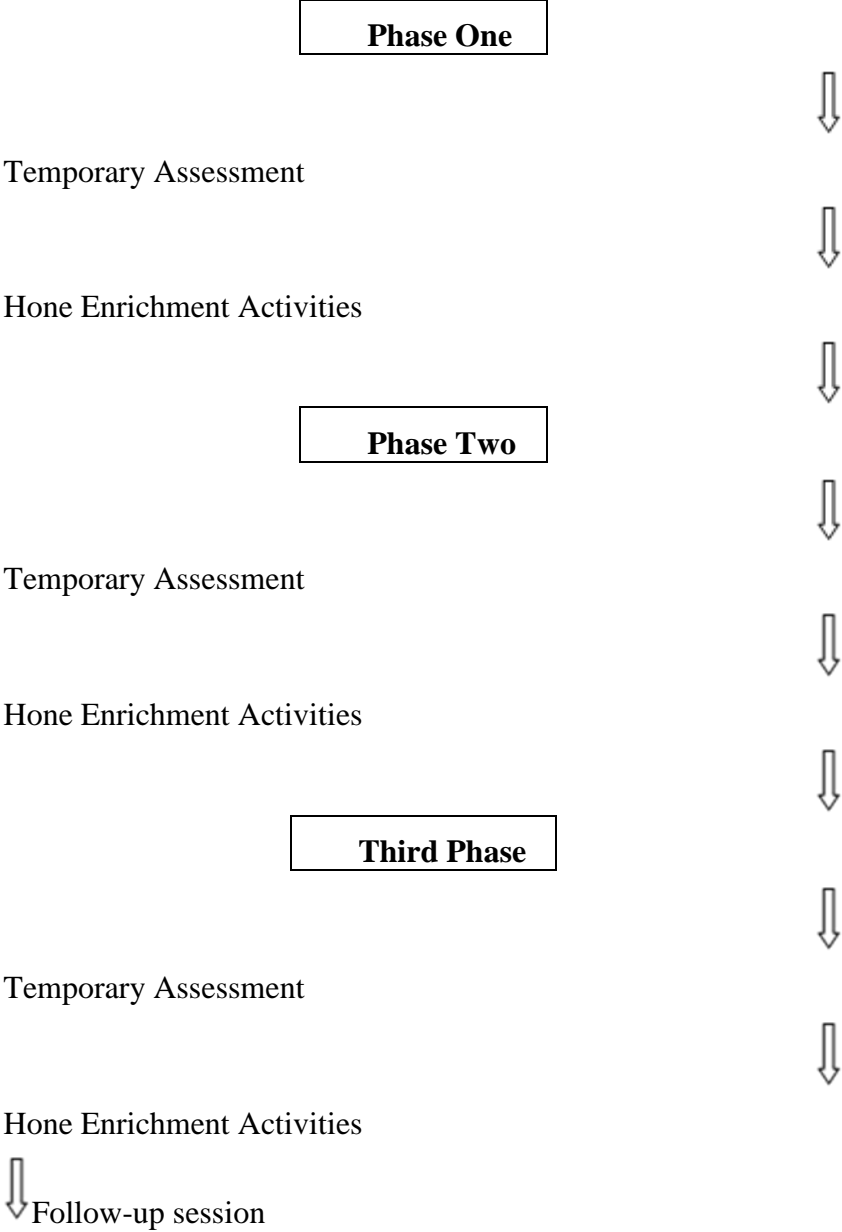
- A pre-test to identify the level of basic math operations before exposure to the treatment program.

Intervention Methods of the First Phase

- Providing general educational strategies related to basic math operations, that have proved effective for all students in general education and special education, such as (Keller's personalized system of instruction – advanced experience organizers – task analysis and simplifying – multiple senses – realistic activities – the general education teacher provides these strategies sincerely and effectively, he picks different activities and training from the suggested treatment program according to

<p>the difficulty that the student faces.</p> <ul style="list-style-type: none"> – Continuous follow-up and evaluation to student's progress in basic math operations by using the coherent teaching method (chart), the progress of each student is observed based on his achievement towards the desired goals, by making a file for each student. – Based on that, a limited modification and adaptation of the learning method and educational strategies in the second phase for students who did not reach the level of proficiency in basic math skills.
<p>Intervention Methods of the Second Phase</p> <ul style="list-style-type: none"> – The educational intervention in this phase is based on each student's special needs, by continuous evaluation within controlled teaching, condensing the activities, and changing the strategies if student's performance was not improved. – Supervision over student's progress, evaluation of the educational plan and its effectiveness in treatment by continuous follow-up supervised by the specialized teacher and researcher. – Educational intervention is designed to assist the general teaching and not to compensate or replace it, which means that the student continues his studying in the classroom, by administering the strategies directed to him through private class activities or the resource room, and with various teaching methods to achieve best results.
<p>Intervention Methods of the Third Phase</p> <ul style="list-style-type: none"> – Students who didn't achieve the level of ordinary students, even after the treatments in the previous phase, should receive more intensive activities after knowing their favorite learning method and employing that to serve the student and upgrading his level to achieve best results. Students who didn't reach the desired skill of the treatment program after the third phase could be math learning disabilities students, but we cannot be sure that they have learning disabilities but they really need special education services due to learning difficulties or lack of motivation.
<p>Methods of Follow-up Phase</p> <ul style="list-style-type: none"> – Follow-up the students benefiting from the program and their achievement persistency after three weeks of finishing the intervention; students whose performance decreased less than the average students are considered to be students with special education needs – Pupils whose performance is lower than that of the average pupil are considered to be students with special education needs and might be students with learning disabilities, the researcher noticed that the performance of four students declined after the response to the intervention.

Plan of the Treatment Diagnostic Model Plan



To verify the reliability of the treatment-diagnostic model, it has been reviewed by 15 specialized referees in mathematics to provide comments regarding the model and the activities provided to the students as well as the adequacy, referee's opinions and comments had been taken into consideration, referees' agreement rate was good, regarding the model in general and how the objective relates to the activity, ranged between 66%-98%.

Basic Math Operations Skills test for Fourth Grade – Prepared by the researcher

The researcher has developed a scale to diagnose the difficulties related to math among students with learning disabilities according to the following steps:

First step: identifying math areas and difficulties, in this step, the researcher achieved a list of math learning disabilities which the scale seeks to measure, by referring to a set of scales related to identifying math learning disabilities, such as K-math.

Subjects related to math learning were identified based on the problems and difficulties faced by individuals identified with math learning disabilities, as mentioned in the related literature review, the test included: the concept of numbers, basic four operations.

Step Two: Developing the Scale: After identifying the areas of math learning disabilities and the subjects that the scale will include, the researcher developed the scale on multiple-choice questions, each question contains one of math learning disabilities and followed by four options represent patterns of math learning disabilities as mentioned in the literature review. The preliminary version of the scale consisted of (56) items.

Step Three: Questions Adequacy to the Age Group: Analyzing the fourth-grade curriculum and eliminating the item (question) that doesn't comply with the grade, in which the level of the item should not exceed the level of the student's level. Therefore, the total became (44) items.

Step Four: Verifying credibility and reliability indicators: Test credibility indicators were achieved by verifying the credibility of the content through the procedures followed in developing the test. Also, the test was reviewed by a set of experienced and specialized referees, their comments and opinions were taken into consideration regarding items adequacy of wordings, structure, and accordance with the areas listed in the scale. Therefore, by taking the agreement coefficient (80% and above) among referees about item's wordings, relevance to the area, and adequacy to the measured difficulty. The total number of items became (40).

To achieve test reliability indicators, the researcher applied the test again (re-test) among (20) student of the main sample after two to three weeks from applying the main test, reliability was (0.925).

Also, reliability was calculated by using Cronbach's Alpha for the main sample consisted of (30) students, the reliability coefficient was (0.911).

Statistical Methods

- Data were entered into SPSS software to extract means and standard deviation.
- Making a profile for each student to follow-up his performance progress.
- Results analysis by using four phases' model, starting from the first phase and ending with the follow-up stage.

Results and discussion

Question Number One

What is the effectiveness of RTI in identifying math learning disabilities compared with discrepancy criterion model?

To answer this question, the researcher extracted the identification phases' results of math learning disabilities students by using discrepancy criterion method and the RTI model, stages are shown in table (1).

Table (1): Phases of identifying math learning disability students by using discrepancy criterion method and RTI.

Number of Math Learning Disability Students According to the Discrepancy Criterion Method before Applying RTI Model (30)	Number of Students according to RTI Model	End of Phase 1		End of Phase 2		End of Phase 3		Follow-up	
		Number	Mean	Number	Mean	Number	Mean	Number	Mean
Mean of students before RTI for basic math operations (13)	Targeted	13	25.4	6	27.5	7	26.8	22	27
	Not targeted	17	18	14	20	9	19.7	12	19.3

* Targeted students are those who reached the desired level.

*maximum degree is (30) and the desired is (24) degrees.

Results show that RTI model has decreased the number of students who suffer from math learning disabilities according to the discrepancy criterion because, in reality, they don't suffer from math learning disabilities, their lack of academic achievement may refer to the teaching methods or lack of motivation towards learning.

The number of math learning disability students decreased in the first phase from 30 students to 17 students, according to the discrepancy criterion, from 17 to 14 students in the second phase, and from 14 to 9 students in the third phase. The total number of students who responded to the intervention was (21) students.

In the follow-up session, where the administration of therapeutic intervention has been stopped, three students declined and didn't keep up the desired level of basic math operations test. This decline may refer to

the inadequacy of the therapeutic intervention or students' psychological unwillingness regarding the test in the follow-up session.

The number of students who didn't respond to the intervention methods was 12 out of 30 students at the end of the follow-up session, which represents 40%, while 18 out of 30, which represents 60%, responded and achieved the desired level.

The previous result is an indication for the effectiveness of the RTI model based on qualitative analysis and accurate diagnosis for each student, in which the RTI model included a set of teaching strategies that have proved effective by previous studies. Also, this model emphasizes the student's preferred learning patterns.

Therapeutic interventions were administered to each student in the education process according to his abilities and pace; each student complete his tasks and advance in his progress due to his pace, enrichment activities are provided to him in order to confirm achieving the desired level and to enhance the student to improve his motivation, meanwhile, alternative simple activities are provided to students with learning disabilities.

This result agrees with the results of:

(Sarrell, 2014), (Vaughn, S., Roberts, G. 2013), (Michelle Maskill, 2012), (Bryant, et,al, 2008), (VanDerHeyden, Witt, and Gilbertson, 2007), (Alansary, 2008). that RTI model has decreased the number of students who suffer from math learning disabilities

Question Number Two

What is the effectiveness of RTI in basic math operations among math learning disability students, as a qualitative analysis model compared with the discrepancy criterion quantitative model?

Mean and percentage were extracted by applying pre-test and post-test for the three therapeutic phases according to the RTI model, table (2) shows the results of the phases' analysis.

Table (2): Students' Responsiveness to the treatment in each phase according to the RTI model.

RTI	Phase One			Phase Two			Phase Three			Follow-up Phase	
	Before	After		Before	After		Before	After			
Mean	13.3	26.6		20.5	27.6		23.3	28.2			
Number of Beneficiaries from the Model			10			6			7		
Percentage			33.33			20			23.33	76.66	4 students declined after the follow-up phase, and the percentage became 63,33
23 students were out of math learning disabilities circle (76.66), 4 students declined in the follow-up stage, the percentage became (63,33)											

- Table 2 shows that 10 students responded to the therapeutic intervention in phase one, mean was (13.3) before the intervention and became (26.6) after the intervention which shows improvement on students level after the intervention and confirms the effectiveness of RTI model in math learning disability students treatment.
- It also shows that 6 students responded to the therapeutic intervention in phase two, mean was (20.5) before the intervention and became (27,6) after the intervention which shows improvement on students level after the intervention and confirms the effectiveness of RTI model in math learning disability students treatment.
- Also, it shows that 7 students responded to the therapeutic intervention in phase three, mean was (23.3) before the intervention and became (28.2) after the intervention which shows improvement on students level after the intervention and confirms the effectiveness of RTI model in math learning disability students treatment.
- The rate of students who responded to the treatment through the intervention was 63.3.

- The rate of the students who declined after the intervention was 17.39.

Improvement of student's level after the intervention could be due the three therapeutic phases of RTI's model which are based mainly on diagnosis, in addition to using all the available activities in a scientific manner, based on qualitative information and data collected from each phase the student went through, to make the right decision. Also, RTI is distinguished by entirely depending on curing student's insufficiency by designing a therapeutic program based on accurate diagnostic for each student, which made the model more effective and accurate, it creates a sense of satisfaction among examiners who feel that their decisions are based on qualitative analysis have a significant impact, unlike the discrepancy criterion which decisions depend on purely quantitative results.

While we find the discrepancy criterion model unable to measure the eligibility assessment accurately and objectively where it is affected by environmental conditions. Also, it is not based on early intervention; but it waits for student's failure, which is called the phenomenon on failure spread which characterizes the discrepancy criterion model, and then comes the intervention for treatment which is contrary to the early detection philosophy. In addition, adequate assessment and identification tools for the discrepancy criterion are not available for all ages, achievement areas, or the actual performance (Alzayyat, 2008).

This result agrees with the researches of each of: (VanDerHeyden, Witt, and Gilbertson, 2007), (Alansary, 2009), (Sundling, 2014), (Sarrell, 2014).

Question Three

How stable are the intervention methods based on RTI's model in developing basic math operations for math learning disability students during the follow-up phase?

To answer the third question, the researcher calculated the number of beneficiary students, the rate of improvement, number of declining cases, and the intervention methods reliability rate for the three faces according to RTI's model, table (3) shows how stable are intervention methods.

Table (3): Reliability rate of the intervention methods in math learning disability students' treatment.

Number of students	First phase				Second phase				Third phase				Follow-up phase			
	Number of beneficiaries	Improvement rate	Number of declining students	Reliability	Number of beneficiaries	Improvement rate	Number of declining students	Reliability	Number of beneficiaries	Improvement rate	Number of declining students	Reliability	Number of beneficiaries	Improvement rate	Number of declining students	Reliability
30	10 out of 30	33.3	1	90.0	6 out of 20	30.0	1	83.3	7 out of 15	46.6	2	71.4	23 out of 30	76.6	4	82.6

It could be noticed that:

- The number of beneficiary students from RTI's model is 19 out of 30 students and were not anymore categorized as math learning disability students.
- The number of non-beneficiary students from RTI's model is 11 out of 30 students, and they do have math learning disabilities.
- The rate of beneficiaries by the end of the follow-up phase $30/19 = 63.3$
- The rate of non-beneficiaries by the end of the follow-up phase $30/11 = 36.6$.
- Intervention phases reliability rate = 82.6.

This indicates that RTI's model has adequate reliability degree, which could be referred to the correct and accurate method of applying the model in terms of the procedures used to monitor students' progress and the regularly measuring their responsiveness for the interventions. Taking into consideration the current teaching circumstances represented in the number of students, lack of adequate training, and all data were collected directly through the therapeutic program and subject to the

qualitative analysis. In addition to the effectiveness and creditability of activities and strategies provided to the students through different phases, continuous follow-up to students' progress in all phases through obvious time frames, to avoid not taking the right care of students in the right time, through continuous evaluation and consultancy, monitoring each student progress compared with achieving the objectives, and pointing out students' strengths and weaknesses by comprehensive individual evaluation before categorizing them by reviewing each student profile.

All of this exemplifies the credibility and reliability of RTI's model.

This result agrees with (Grosche & Volpe, 2013) and (Alansary, 2009). The intervention response model has a suitable degree of stability

Recommendations

In the light of these results, the researcher recommends the following, which may contribute to facilitate applying RTI's model and to provide educational treatment programs to achieve the best results:

- Inviting the researchers and students to submit papers and researches that prove the effectiveness of RTI in all developmental and academic difficulties.
- To conduct special training courses for teachers and specialists to sensitize them about students of learning disabilities and how to identify them by using qualitative analysis and exposing them to training situations which enable them to deal with them by using RTI's model and how to apply this model with at the lowest possible cost and best results.
- Early Intervention is the core of RTI's model since early intervention avoids the failure spread phenomenon, which identifies and categorize the student in advanced grades.

References

- Alabsi, Mohammad. (2014). *Methods of Teaching Math for those of Special Needs*. 3rd Edition, Jordan, Amman.

- Alansary, Mohamed Ali. (2009). *The effectiveness of the RTI model in developing word identification skill for learning disabilities students at the basic stage in Kuwait*. Unpublished Thesis. Arab Gulf University, Bahrain.
- Alzayyat, Fathy Mustafa. (2007). *Contemporary Issues in Learning Disabilities*. Cairo: Cognitive Psychology and Learning Disability Series.
- Alzayyat, Fathy Mustafa. (2008). *The Predictive Value of Identifying and Diagnosing Learning Disabilities among Qualitative and Quantitative analysis models*, Global Conference of Learning Disabilities, Riyadh, Saudi Arabia.
- Brown-Chidsey, R. & Steege, M. W. (2005). *Response to Intervention: Principles and Strategies for Effective Practice*. New York: Guilford Press.
- Bryant, D. P. Bryant, B. R. Gersten, R. M. Scammacca, N. Funk, C. Winter, A. Shih, M. & Pool, C. (2008). The Effects of Tier II Intervention on the Mathematics Performance of First- Grade Students Who are at Risk for Mathematics Difficulties. *Learning Disability Quarterly*, 31(2), 47–65.
- Bryant.D.P. (2011). Early Numeracy Intervention Program for First-Grade Students with Mathematics Difficulties. *Council for Exceptional Children*, Vol. 78, No. J, pp. 7-23.
- Fleishner, J. (2004). *Diagnosing and assessment of mathematics learning disabilities*. In G. Layon(Ed). *Frames of reference for the assessment of children with learning disabilities*. Baltimore. Paul H Books.
- Gresham, F. M. (2002). Responsiveness to Intervention: An Alternative Approach to the Identification of Learning Disabilities. In R. Bradley, L. Danielson, & D.L. Hallahan (Eds.), *Identification of Learning Disabilities: Research to Practice*. 467-519. New Jersey: Lawrence Erlbaum Association.

- Grosche.M, Volpe, R. (2013). Response-to-intervention (RTI) as a model to facilitate inclusion for students with learning and behavior problems *European Journal of Special Needs Education Volume 28, 2013 - Issue 3*
- Hafeth, Nabeel Abdelfattah. (2008). *Learning Disabilities and Therapeutic Learning*, Egypt.
- Lashab, Asmaa. (2015). Identifying Math Learning Disabilities among Basic Stage Students and Methods of Treatment. *Educational and Psychological Studies Journal*. 15.
- Maskill, M. (2012). *Study of the effectiveness of response to intervention used in elementary school*. Master's Theses and Doctoral Dissertations. <https://commons.emich.edu/cgi/viewcontent.cgi?article>.
- Mursi, Kamal Ibrahim. (1998). *Non-verbal Intelligence Test*. Third Revision, Ministry of Education: Kuwait.
- NJCLD. (2005). Responsiveness to Intervention and Learning Disabilities: A Report Prepared by the National Joint Committee on Learning Disabilities Representing Eleven National and International Organizations. <http://www.NJCLD.org>.
- Sarrell, Daphne Moore. (2014). *The Effects of Reflex Math as a Response to Intervention Strategy to Improve Math Automaticity among Male and Female At-Risk Middle School Students*. A Dissertation Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Education. Unpublished Ph.D. thesis, Liberty University.
- Shabier, Emad. (2011). *The Impact of Problem Solving Strategy in Math Learning Disabilities Treatment among Eighth Graders*. Unpublished Thesis, Alazhar University, Ghaza.
- Shalaby, Amina Ibrahim. (2009). *The Effectiveness of Educational Toys in Therapeutic Teaching among Math Learning Disability Students of the Basic Stage*. Annual Conference for the Faculty of Education, Almansoura University.

1766 ————— "The effectiveness of response to"

- Sheldon, H. (2005). Research Roundup: Response to Intervention-A Primer, Director of Professional Services, *NCLD*. www.NCLD.org.
- Sundling, Nicky. (2014). *Effective Math Intervention Programs for student in Grades Three Through Five*. in fulfillment of final requirements for the MAED degree, St. Catherine University, St. Paul, Minnesota.
- VanDerHeyden, A. M. Witt, J. C. & Gilbertson, D. (2007). A Multi-Year Evaluation of the Effects of a Response to Intervention (RTI) Model on Identification of Children for Special Education. *Journal of School Psychology*, 45, 225–256.
- Vaughn, S. Roberts, G. (2013). Effects of a Response-Based, Tiered Framework for Intervening with Struggling Readers in Middle School. *Read Res. Q.*, 48, 237-254. doi:10.1002/rrq.47.